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ABSTRACT

The purpose of this study was to determine if power, fear of failure, and achievement motive scores could predict athletes' self ratings and coaches' ratings of athletes' competitiveness. Subjects were 33 male and 10 female members of volleyball, basketball, track and field, and cross country university athletic teams. Athletes answered Form B of the Sports Attitudes Inventory, a sport-specific instrument designed to measure three competition related motives. Subjects then rated themselves on competitiveness, and coaches' ratings of athletes' competitiveness were obtained. Results of a step wise regression analysis revealed that coaches' ratings of the athletes' skills were the most important predictors of the coaches' competitiveness ratings. Self-peer ratings of competitiveness and power motive scores were also important predictive variables. Results confirmed earlier findings with female high schol athletes with respect to the relationship between coaches' perceptions of competitiveness and skill. Power was found to be the best of the three motives in predicting coaches' ratings of competitiveness, and fear was found to be the next most frequent motive. (Authors/FG)

THE RELATIONSHIP BETWEEN COMPETITIVE MOTIVES AND RATINGS OF COMPETITIVENESS

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Running head: Ratings of Competitiveness and Competitive Motives

Abstract

The purpose of this study was to determine if power, fear of failure, and achievement motive scores predicted self ratings and coaches' ratings of competitiveness. Subjects were members of four (4) university varsity athletic teams who answered Form B of the Sports Attitude Inventory which is a sport specific instrument designed to measure three competition-related motives. Subjects rated themselves on competitiveness based upon the construct as explained by the investigator. Coaches' ratings of competitiveness were also obtained. Coaches' ratings of competitiveness correlated .66 with skill ratings, .28 with self ratings of competitiveness, and -.37 with fear of failure. Coaches' ratings of skill correlated -.48 with fear of failure. Results of a step wise regression analysis revealed that coaches' rating of skill was the most important predictor of the coaches' competitiveness ratings. Self-peer ratings of competitiveness and power motive scores were also important predictive variables. Results confirmed earlier findings with high school athletes with respect to the relationship between coaches' perceptions of competitiveness and skill. Results lend support to validation claims for the measures of power motive, fear of failure, and the achievement motive.

Relationship Between Competitive Motives and Ratings of Competitiveness

In spite of the importance of competitive temperament to sport success, there have been relatively few attempts to measure this key variable. Berridge (1935) was the first to study competitiveness using effort expended in a strength task as a measure of competitive temperament. Booth (1958) selected items from the MMPI which proportedly discriminated between good and poor competitors. With two samples of athletes, 22 items were found to correlate .63 and .65 with coaches' ratings of competitive spirit. Two independent studies of football players and wrestlers failed to validate the Booth Scale (Kroll and Peterson, 1966; Rasch, Hunt and Robertson, 1961). More recently, three scales to measure competition-related motives were developed for use with athletes (Willis, 1982).

The purpose of this study was to explore the relationship between competitive motives and ratings of competitiveness. It was hypothesized that motive scores for power, achievement, and fear of failure would be important variables in predicting self ratings as well as coaches' ratings of competitiveness.

Method

Subjects were university students who were members of four varsity athletic teams. Of the total of 43 students, 33 were

male and 10 were female. The teams represented were volleyball, basketball, track and field and cross country. The three motive scales were administered in questionnaire form to subjects in groups. Subjects also rated themselves on competitiveness utilizing the self-peer ranking method (Holmes, 1971). The constructs of competitiveness and skill were explained to the head coaches who then rated each athlete on a scale of 1 to 7 on both dimensions. Ratings for skill and competitiveness were completely chosen independently of each other.

Results

Intercorrelations among the 6 variables are shown in Table 1. Significant correlations were found between coaches' ratings of competitiveness and skill ratings and fear of failure. Significant correlations were also found between self-peer ratings of competitiveness and coaches' ratings of competitiveness, skill and power motives.

Enter Table 1 about here

Two step-wise regression analyses were performed which used coaches' ratings and self-peer ratings of competitiveness as the criterion variables. Multiple correlations and beta weights are shown in Table 2. The multiple R for coaches' ratings of

competitiveness was .66 which accounted for 36.9 percent of the variance. For self-peer ratings of competitiveness, the multiple R was .57. The amount of variance in self-peer ratings explained by the predictor variables was 32.9 percent.

Enter Table 2 about here

For both criterion variables skill was found to be by far the best predictor variable. Of the motive scales, power contributed most significantly to the prediction of coaches' ratings of competitiveness. Achievement and fear of failure were the best motives in predicting self-peer ratings of competitiveness. The results appear to confirm the hypothesis that motive scores would be important predictors of competitiveness ratings. The results also support the construct validity of each of the motive scales.

Discussion

The results of this study confirmed the findings of an earlier study of high school female athletes with respect to the relationship between coaches' perceptions of competitiveness and skill. The relationship between self-peer ratings of competitiveness and skill was also replicated.

In this study power was found to be the best of the three motives in predicting coaches' ratings of competitiveness

followed closely by fear. In the previous study the opposite was found, that is, fear was the best predictor followed by power. Achievement motive was not a good predictor of coaches' ratings of competitiveness in either study. In the prediction of self-peer ratings of competitiveness, however, achievement was the best predictor followed by fear. This finding is different from the previous study in which fear and power were the best predictors. The differences in the results of the two studies were possibly due to the different levels of athletes in each of the studies. It is possible that there may be basic motivational differences between high school and university athletes. Another possible explanation may be that one sample was entirely female while the other was mostly male. Earlier studies, however, showed no significant sex differences in motive scores.

Since skill ratings seem to be important to ratings of competitiveness, it would be of interest in future studies to see if other measures of skill would be as effective. Several measures of skill used in combination might significantly improve the prediction of competitiveness. It would also be of interest in future studies to increase the number of motives studied. The addition of motives such as the need for affiliation might add significantly to the understanding of why athletes compete.

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Table 1

Correlation Coefficients Among Ratings of Competitiveness and Skill and Motive Scores

Variables	2	3	4	5	6
1. Self Peer Ratings of Competitiveness	.35	.28*	-.09	.43**	.13
2. Coach's Ratings of Competitiveness		.66**	-.37*	.18	.05
3. Coach's Ratings of Skill			-.48**	.13	.10
4. Fear Motives				-.13	-.01
5. Power Motives					.63**
6. Achievement Motives					

* $p < .05$

** $p < .01$

Table 2

Beta Weights and Multiple Correlation Coefficients
For Coaches' Ratings and Self Ratings of Competitiveness

Criterion Variables	Multiple Correlation	Beta Weights for Predictors					
		Skill	Power	Fear	NACH	Coach's Ratings	Self Peer Rating
Coach's Rating	.660	.564	.280	-.160	.081		.134
Self Peer Rating	.574	.476	.132	.268	-.386	.159	

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ABSTRACT

Three types of homework assignments are common in schools in the United States: practice, preparation, and extension. To be effective, practice exercises must be highly individualized and based on the progress of each student. Preparation normally refers to reading assignments given prior to class meetings. Homework of this sort should be carefully assigned to ensure that the student receives a clear idea of the assignment's purpose. Extension homework attempts to take the student beyond the work done in class. Research into the effectiveness of homework in improving academic achievement is inconclusive. The role of homework as a link between home and school is vital, and assignments can serve as a means of providing a bond of common effort between parent, child, and teacher. Inappropriate or badly explained assignments, however, can just as readily serve as a source of antagonism between parent, teacher, and child. The emergence of cable television, home computers, videotape and videodiscs, and information utilities is changing the role and format of home study, and, for the teacher interested in the question of homework, the primary significance of these trends lies not in their suggestions for present homework practices but rather their implications for future practices. A list is provided in this pamphlet of basic guidelines and principles that can help the classroom teacher arrive at a feasible homework policy. (JD)

What Research Says to the Teacher

Homework
as a Learning Experience

by Ronald T. LaConte

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INTRODUCTION

As we enter the last two decades of the twentieth century, the process of education seems certain to undergo dramatic changes. The impact of new technology and information delivery systems, as well as economic and demographic alterations in the nation's social structure will in all probability reshape learning methods in the United States. Perhaps no single aspect of U.S. education will change as much or as rapidly as the process of studying at home (13, 43).*

Because teachers and students alike, as well as parents, will be facing these changes with attitudes and expectations formed by both current and past practices, a brief review of this process will be helpful to establish a historical perspective.

Throughout most of its existence, from Colonial times until well into the twentieth century, the U.S. school was considered primarily a dispensary of information, a temple of learning, where teachers imparted essential knowledge to the young. In a predominantly agrarian nation composed of a widely scattered and immigrant population, at a time when all human "knowledge" might be found in an encyclopedia, this was a reasonable and workable concept. The purpose of the school was to impart to the young the essential skills and the basic information that would enable them to take their place among the educated. Through the medium of the printed word—and later through drawings and photographs—the school also attempted to provide windows on the world to those children whose out-of-school experiences were limited to their immediate environment.

In this context, study at home or homework was a straightforward and simple matter. Students were given at-home tasks which involved practice in skills learned in school; or they were expected to prepare, usually by reading, for the next day's lessons. Assignments often involved substantial amounts of memorization—names, dates, sequences of events, passages of literature—and practice drills, particularly in mathematics. Since there was substantial, if not universal, agreement on *what* should be learned, the only questions concerning the home study were those related to how much should be assigned, at what age level it should begin, and so on.

*Numbers in parentheses in the text refer to the Bibliography beginning on page 28.

During the second quarter of the twentieth century, however, new educational philosophies emerged that cast this study at home in a different light. Dewey's concept of problem solving as a basic educational activity, for example, did not readily admit the need for memorization and drill. In this view homework, if necessary at all, should be an extension of the problem-solving activities begun in school. Other philosophies, such as the life adjustment movement, also called into question the need for home study, frequently citing it as an unwarranted intrusion into the student's private at-home time.

Since the end of World War II, a number of factors have combined to make the topic of homework confusing to both teacher and parent, and, on occasion, the center of public controversy. Shifts in demographic patterns, begun around the turn of the century and accelerated in the postwar years, rapidly transformed the United States from a rural to an urban society. At the same time television and other mass media inundated the society with information. The information-poor child of the nineteenth century suddenly became the information-saturated child of the midtwentieth. And knowledge itself began to grow at such an accelerated rate that the schools could no longer easily identify just what "everyone should know." New insights into the traditional academic subjects raised doubts about the structure of the various disciplines; "new maths," "new grammars," and "new physics" challenged the very content of the traditional curriculum. Throughout the 50's, 60's, and 70's a variety of new approaches—some student-centered, some subject-centered called into question much of what was once considered the core of a solid, basic education.

Amidst all the change and confusion, the practice of assigning homework was both championed and challenged, defended as an academic necessity and derided as useless busywork. Parents schooled in the old math threw up their hands in despair at the new math homework of their offspring. Rebellious and restless children of the television age protested at-home drill and practice, and indeed often resisted any sort of homework assignment. Conflicting educational philosophies among teachers, often working side by side, prompted vastly different homework policies. The comfortable consensus of the nineteenth century was completely shattered, replaced by a wide and shifting variety of individual attitudes and practices.

Ironically, outside public education the concept of home study was taking a firm hold. Aided by new developments in inexpensive electronic media, home study courses continued to grow at a rapid rate. By 1980 it was possible to study everything from effective communication to organic gardening using tapes, cassettes, slides, records, and other devices combined with individual study guides. In England the Open University offered a full degree program via home television, and in the United States it became possible to earn college credits from the Sunday newspaper as well as from television.

As we look forward to an age filled with videodiscs and cassettes, home computers, and new possibilities for educational TV through cable networks and satellite transmission, it appears obvious that we are on the brink of an era of unprecedented growth of home study (13).

Yet even as this era draws rapidly closer, as the line between classroom and living room begins to blur, the old questions persist. How much homework? how often? to whom? for what purpose? at what age? Unfortunately, after all these years there are still no definitive answers. But a look at what research tells us may shed some light on these questions and on the new ones about to be raised.

THE NATURE AND PURPOSES OF HOMEWORK

Not surprisingly, most teachers automatically equate home study with homework – tasks assigned students during the school day to be carried out at home. It is important to remember, however, that school assignments constitute only a part (and a shrinking part at that) of a much more complex pattern of home study in this country. The seventh grader leaving the school bus with an armload of books and a full assignment pad may very well enter a house to find a mother taking a home study course in office management, a father preparing for a job-related examination, or an older brother learning to play the guitar by mail. While this sort of home study is far from typical, it represents a growing trend and is common enough so that teachers should consider the possibility that their student with the homework assignment may have to compete with other members of the household for study time, space, and attention.

Against such a background, let us examine the various kinds of homework usually assigned in schools today. Lee and Pruitt have developed a useful taxonomy of homework types designed to help pre-service and in-service teachers clarify their homework policies and practices (32). While the entire taxonomy is too elaborate to describe here, the three basic categories – practice, preparation, and extension – provide a useful framework for discussion.

Practice

Perhaps the most familiar and certainly the longest-standing kind of homework is the practice exercise. The purpose of such assignments is to provide students an opportunity to reinforce newly acquired skills or apply recent learnings. For example, after a lesson on a particular arithmetic operation, the student receives a homework assignment to practice performing the operation. Or after the introduction of a historical or geographical fact in class, the assignment is to memorize the fact at home – an attempt at reinforcement of learning that was once very common but little practiced today.

Despite the strong tradition of this type of homework, it is highly questionable in terms of both effectiveness and utility (4, 21). Far too often practice-type homework assignments are dull, unimaginative, repetitive exercises that produce little besides student boredom. Only a very unusual student is excited and challenged to perform a page of essentially similar mathematical operations or to underline subjects and verbs in twenty or thirty sentences. The able student frequently masters the skill quickly and plods mechanically through the remainder of the exercise merely to complete it, while the less able student, more in need of the practice, soon gives up.

This is not to suggest that practice exercises cannot be useful. They are most valuable, however, when they are carefully matched to the ability and background of the individual student (as in the case of the piano teacher who chooses practice pieces according to the student's progress). Research findings about individualized prescribed instruction over the past several years indicate that careful monitoring of pupil progress, and appropriate and well-timed feedback are essential to the success of such learning (43). "Blanket" homework practice assigned an entire class, no matter how well intentioned, simply cannot be sufficiently individualized to be effective. Practice drill of this type is better left to the classroom where the teacher is available to help make the necessary adjustments for individual differences. It must be acknowledged, however, that in many cases class size makes individualization of assignments more difficult for the teacher.

The most effective kind of practice assignment asks the student to apply recently acquired learning in a direct and personal way. For example, students who have recently studied cloud types may be asked to find and label old magazine photographs of the various clouds. Or students who have learned about a particular chemical reaction may be asked to find examples of the reaction in their own environment.

Preparation

"For tomorrow, read chapter 7 and answer questions 1, 3, and 6 at the end of the chapter." This type of homework assignment is one of the most common, particularly in the upper grades. The intent is to

have the student obtain sufficient background information to be prepared for the following day's discussion or lecture. In some subject areas (literature, for example) this kind of preparatory reading is a continuous process. While such preparation can be a valuable part of the pattern of learning, such homework assignments can also be ineffective unless teachers assign them carefully.

One of the most important considerations in assigning preparatory reading is to give students sufficient guidelines. In the example just cited, for instance, students need a clear understanding of *why* they should read chapter 7. Does it contain significant new information or concepts? How does it relate to what has gone before? Is it an expansion? an illustration? a continuation? Students should also receive clear guidance on *how* to read the chapter. Are they looking for specific information or merely getting an overview? Should they attempt to relate all or part of what they read to what they have previously learned? How is the chapter particularly significant? Why are they to answer questions 1, 3, and 6 and not 2, 4, and 5? Is the material covered by this second set of questions less important? And so on. If students are to profit from preparatory reading, this sort of guidance is not incidental, but absolutely essential.

Another consideration is the length or difficulty of a reading assignment. Some teachers at the secondary level have no clear idea of the reading speed or ability of their students, other than group test scores sometimes supplied by the guidance office. At least one study has shown that teachers consistently underestimate the amount of time students will spend on an assignment (39). In addition, teachers of different subjects rarely coordinate homework assignments in terms of either length and difficulty or content. As a result, students may become overburdened with several difficult assignments on one night and have little or no homework the next, or they may do isolated readings in closely related subjects such as U.S. history and literature. When teachers coordinate these readings, the assignments can become much more meaningful.

In addition to assigned reading in the class text, other kinds of preparatory homework include asking students to do library research, to study some aspect of their environment, to collect and assemble materials for a class demonstration, or to carry out any number of other activities requiring the gathering and organizing of

information prior to a class discussion. As with practice assignments, preparation homework that calls for initiative, imagination, and individual effort provides a greater challenge and offers much more stimulation than the routine read-the-chapter, answer-the-question type.

Extension

Extension assignments attempt to take the student beyond the work begun in class and to encourage individualized and often creative and imaginative pursuit of knowledge. Rather than mere more-of-the-same practice or read-to-get-ready preparation, extension homework aims at individual application, research, and study.

Frequently, work of this sort takes the form of a long-term, continuing project that parallels the class work. Less often is a one-night assignment designed to take the student beyond the work done during the day. In either case the primary characteristic of extension homework is its focus on student *production* rather than *reproduction*. Its aim is to foster student initiative for learning by allowing a great deal of student choice in expanding on the learning begun in class. Extension homework is often built around problems, either student-identified or teacher-identified, that enable the student both to apply previous learnings and to reach out to new understandings.

A second feature of extension homework is its individuality. Except in those cases where students are permitted to collaborate on an assignment, no two projects or papers will be the same. Because so much of the effort is student-initiated, there is little danger of the kind of copying and cheating that may accompany routine homework.

Extension homework can be made mechanical and routine, of course, in which case it loses much of its value. A class studying the history of the U.S. labor movement, for instance, might be assigned the task of finding out the names of the current presidents of the 20 largest labor unions. While such an exercise technically "extends" the work being done in class, it is really a rather simple library assignment that does little to extend the student.

While these three categories cover most of the different kinds of homework normally assigned by teachers, they obviously do not de-

scribe all types, particularly some of the more imaginative and creative assignments. It is fair to say, however, that very few school homework assignments cannot fit under one of these three headings.

Purposes

If practice, preparation, and extension summarize the kinds of homework that teachers normally give students, these three terms only begin to describe the purposes usually cited to justify the assignment of home study. Among those most frequently advanced are the following:

1. Homework is good discipline. Over the years many teachers have believed that homework is good for students, irrespective of any learning that may result from it. This view holds that the sense of accountability and responsibility engendered by homework assignments is a valuable end in itself and that schooling is somehow "cheapened" without substantial amounts of out-of-class work.

2. Homework eases time constraints on the curriculum. According to this argument the school curriculum, particularly in the upper grades, is so demanding that without substantial home study, it would be impossible to cover meaningful amounts of material. Without preparatory reading and practice application outside class, the amount of work accomplished in a given time period would be considerably reduced. In effect, this is an argument for a longer school day.

3. Homework fosters student initiative, independence, and responsibility. While students' lives are regulated by bells and attendance slips during the school day, the management of their afterschool hours is largely up to them. As they learn how to budget time to fit homework in among their other activities, students learn valuable lessons that will serve them the rest of their lives.

4. Homework reinforces and supplements school learning experiences. By providing the necessary integration, practice, and application, as described earlier, home study facilitates and improves learning.

5. Homework brings the school and the home closer together. Not only do take-home assignments help answer the "What-did-you-do-in-school-today?" question, but they help assure parents that their children are indeed doing *something*. And if parents can participate in the process by helping with the assignment, the link between school and home can be strengthened. As we shall see later, however, this aspect of homework can also lead to other problems.

A study of the time allocated to homework assignments found a wide variation among fifth, eighth, and tenth grade mathematics and reading–language arts teachers in New York City and Connecticut (23). In general, the higher the teacher's perception of a class's ability level, the greater the homework assignment. In the upper grades more homework is assigned and learning activities shifted from the classroom to the home. These circumstances produce a kind of circularity in which able students, who tend to come from supportive home environments, are assigned large amounts of homework. This increases the influence of the home environment in the learning process, which in turn increases the influence of the home environment on academic achievement.

Summary

Three types of homework assignment are common in U.S. schools: practice, preparation, and extension. Routine practice drills are of questionable value and may even be counterproductive, especially for able students. Mechanical exercises tend to bore the able and frustrate the slow, sometimes leading to copying and cheating. To be effective, practice exercises must be highly individualized, based on the progress of each student. Especially valuable are practice exer-

cises requiring creative and imaginative application of newly learned principles or skills to student-identified situations or circumstances.

Preparation normally refers to reading assignments given prior to class meetings, although other kinds of preparation can be required. Homework of this sort should be carefully assigned to ensure that the student receives sufficient specific instruction, explanation, and guidance – that is, a clear idea of the purpose of the assignment. Extension homework attempts to take the student beyond the work done in class. It frequently uses projects, problem solving, or individual research as methods of organization. Typically, it involves a high degree of student participation in both the identification of the topic and the method of investigation.

Among the reasons often cited for giving homework are (1) its usefulness as an act of intellectual discipline, (2) its easing of time constraints on the amount of curricular material to cover, (3) its ability to foster student initiative, independence, and responsibility, (4) its value in supplementing and reinforcing work done in school, and (5) its ability to bring home and school closer together.

THE USEFULNESS OF HOMEWORK

Certain key questions about the usefulness of homework keep recurring in the literature. Does homework really help students learn? If so, what is the optimum amount to assign? What kind of assignments are most effective? Are there beneficial side effects? Or harmful ones? What is the relationship between the student's age and ability and the type and quantity of home study?

It would be satisfying at this point to be able to list and explain the answers to these questions. Unfortunately, the body of current research fails to provide any definitive answers. Some of these questions have not been researched at all. Others have yielded conflicting and often contradictory results. On the other hand, there seems to be some kind of consensus among experienced teachers and educational experts.

First, what does research tell us about the effect of homework on the improvement of learning? Not surprisingly, most of the work in this area has focused on the field of mathematics, generally aiming at high school and college students. While the results are hardly uniform, there are some suggestions that homework, under certain conditions, does improve test scores and grades. For example, one study reported that a review of homework research in mathematics indicated that homework seems preferable to nonhomework, that the effects of homework may be cumulative, and that drill homework may not be of much value (4). A second study noted, however, that required drill homework *did* improve mathematics grades without producing negative effects on student attitudes (35). And a study of the effectiveness of mandatory versus voluntary homework in an engineering course reported that higher test scores accompanied mandatory homework assignments (29).

On the other hand, several researchers reported finding no measurable link between homework assignments and improved mathematics performance (15, 17, 34). Another study noted that homework assignments had minimal impact on the performance of primary grade students (26), and another reported no improvement in the performance of high school shorthand students due to homework procedures (36).

In related studies a National Assessment of Educational Progress statistical analysis examined the relationship between amount of homework, amount of television viewing, and presence or absence in the home of such items as a specific place for study, reading materials, and the like. This study also reported higher performance on mathematics assessment tasks associated with more homework—and with less television viewing (1).

Another study also reported the results of a secondary analysis of data collected on 90,000 students in grades 5, 8, and 11 in 750 participating schools in Pennsylvania. When the data were analyzed according to characteristics of students there was little evidence to support any relationship between TV viewing and cognitive or noncognitive achievements. When analyzed according to the characteristics of schools, however, the same data indicated a strong negative relationship between television viewing and cognitive achievements (30). Apparently, television viewing has a harmful effect on cognitive skills only when those skills are considered *within* the school environment.

In a review of 24 research studies on the correlation of homework and academic achievement conducted between 1923 and 1979 Friesen reported that the data neither support nor refute the effectiveness of homework (21). To date there simply has been no study that was able to control carefully enough the many variables that affect the relationship. The researcher suggests that individual teachers weigh carefully the need for home study and, if such study seems logical and useful, structure the assignments carefully so as to maximize student achievement.

In a separate study Friesen also reviewed surveys, questionnaires, and polls taken between 1916 and 1978 regarding homework (22). Over the years there has been a surprising consistency in the attitudes of those surveyed. While the experimental research into the effectiveness of homework may be inconclusive, students have generally believed that it helps them achieve better grades, an attitude that has remained fairly constant over the years. Likewise parents have been consistently strong supporters of homework, an observation supported by more recent studies such as the Farrell and Johnson study of the educational concerns of inner-city black parents. These researchers reported one of the parents' primary concerns to be the lack of homework assigned their children (19). Friesen also noted a gener-

al agreement that the amount of homework increases significantly as a student progresses through school and that the amount of time a student spends working on homework assignments has increased markedly over the past 30 years. Administrators generally approved the idea of increasing amounts of home study from fourth grade on. There is a strong consensus, supported by some research, that homework is both inappropriate and ineffective in the primary grades (21, 22, 26).

A related study of student, teacher, and parent perceptions of homework assignments found that, in general, girls spend more time on homework than boys, tenth graders more than twelfth graders, college-bound students more than non-college-bound students. And, perhaps most significant, this study found that teachers almost invariably think an assignment will take less time than students actually spend on it (39).

What, then, does research tell us about the usefulness of homework? Unfortunately, not nearly as much as we would like.

In terms of improving academic achievement there is no conclusive evidence that homework is very effective, and enough negative research to raise strong doubts about its efficacy. This is particularly true of routine practice kinds of assignments and somewhat less true of preparation. Because of their nature, extension assignments are less likely to be directly linked to academic achievement. But it is difficult, if not impossible, to measure the extent to which individual, at-home, extended study contributes directly to improved test scores. On the other hand, there is a substantial body of reported experiences attesting to the interest, excitement, and (presumed) growth these individual explorations can promote (37, 38, 42).

Research confirms that homework for young children is not only inappropriate, but may well be counterproductive. It also tends to support (albeit very tenuously) the practice of increasing the amount of study at home according to student age and ability level. Older, higher achieving students do show some tendency to improve performance in mathematics when they are part of a program that includes mandatory homework. Whether this improvement can be assumed in other subjects is highly questionable, and it is not supported by empirical research.

Do such findings suggest that people cannot learn privately and at home? Certainly not. The accumulated evidence of countless individ-

uals who have done just that—from hobbyists to convicts who have taught themselves law (not to mention all those who have completed correspondence courses)—provides ample proof that at-home learning is possible. What the research calls into question, however, is the effectiveness of traditional routine homework assignments growing out of a school setting. While a highly motivated convict may well turn into a potential lawyer through self-study, a student who detests mathematics is not likely to become a math wizard by doing extra problems at home.

The implication is clear: Homework assignments for which students are highly motivated and which they feel are useful will promote learning, and those which students see as drudgery will not—they may, in fact, further decrease student interest and lead to cheating. Required exercises, whether practice or preparation, are best accomplished in class under teacher supervision. Homework is best reserved for assignments that extend classwork and increase student interest and motivation. Good teachers have known this for generations.

If these conclusions are true, why is it that so much routine work continues to be assigned as home study?

One answer, as Tevye the fiddler would say, is "It's a tradition!" To a great extent, this answer is valid, except that there is not a single tradition—there are several.

Among these, as noted earlier, many parents expect their children to have homework, and tend to regard teachers and schools that do not assign homework as inferior (19). Further, homework provides a kind of bond between parent, child, and teacher that can be very important to a student's success in school (38). Despite protests of annoyance, parents called upon by their children to help with homework often feel flattered and important, and closer to the children. If the parents feel comfortable and secure with the assignment, they can also feel themselves drawn closer to the teacher and the school. They feel a part of the formal educational process.

If, however, the homework assignment leaves the parents feeling threatened and insecure, quite the opposite result can occur, particularly among educated parents. A college-educated parent baffled by a sixth-grade homework assignment can feel not only frustration but a loss of stature in the child's eyes, which can translate all too easily into

antagonism for the school program. Consider for a moment how such a situation calls into question the validity of the parent's own education to appreciate how threatening it can be. The parent schooled in the curriculum of the 60's or 70's who is faced with questions growing out of non-Newtonian physics, modern set theory, or current systems of linguistic analysis can have some very unsettling questions about the current value of that 15- or 20-year-old education. Conversely, such a parent may question the value of the new subject matter: "What are they teaching that stuff for?" "If it was good enough for me, why isn't it good enough for my child?" Such questions are less likely to be directed at innovations in the sciences (where constant change is an accepted, and expected, fact) than at those in the social sciences and humanities. Recent parental attacks on values clarification exercises and new grammars, for example, have in most cases arisen from homework assignments.

It is vital, therefore, that teachers carefully explain to students any homework accompanying or growing out of curricular innovations or new subject matter. It is also vital that they make an attempt to prepare parents for the new work. Suggested methods include sending parents flyers or handouts explaining the nature of the new material or approach, outlining what the children will be doing, why they are doing it, and what the school expects. Or scheduling meetings or conferences to explain these matters directly to parents.

One approach, instituted by the Philadelphia School District, involves a telephone resource center which provides assistance or information to parents and pupils about problems related to homework, as well as information about parent partnership activities and services available to parents and children in the school district. Eight teachers with expertise in various curriculum areas are assigned to answer phones during the evening hours. These teachers assist students from public, private, and parochial schools from various grade levels. Many of the calls they receive are from parents trying to assist their children with homework assignments (9). This system provides not only widespread, inexpensive tutoring, but an immediate source of relief for frustrated parents, and, accordingly, an excellent opportunity for the school to explain curricular innovations.

While such large-scale approaches are extremely important in keeping the home-school relationship positive and mutually suppor-

tive, their effectiveness depends upon sensitive and sensible practices by classroom teachers. Teachers who avoid assigning large quantities of mindless drill or requiring unrealistically large amounts of reading or using homework as punishment, who instead explain adequately the nature and purpose of each assignment, and match the assignment to the ability and maturity of the students can easily turn both students and parents into friends and supporters of the school.

Summary

Research into the effectiveness of homework in improving academic achievement is inconclusive. While some studies indicate that such improvement does result, an equal number show no demonstrable relationship between homework and improved academic achievement.

The role of homework as a link between home and school is a vital one. Homework assignments can serve as a means of providing a bond of common effort between parent, child, and teacher. Inappropriate or badly explained assignments, however, can just as readily serve as a source of antagonism between parent, teacher, and child.

It is therefore essential that classroom teachers make every effort to ensure that assignments are (1) necessary and useful, (2) appropriate to the ability and maturity level of students, (3) well explained and motivated, and (4) clearly understood by both child and parent.

THE FUTURE OF HOMEWORK

Since the end of World War II a steady stream of develo[illegible] electronics and communications has been gradually chang[illegible] ods of gathering, storing, accessing, and transmitting info[illegible] As we move toward the end of the century, this stream seems l[illegible] become a torrent, flooding the world with new technologies that may well drastically alter entire societies. The period into which we are moving has been called, among other things, the "Communication Era" or the "Information Age." Regardless of the label, however, it appears certain that the next few decades will see dramatic changes in our methods of learning, and that home study will play an increasingly important role in that changing pattern.

While it is impossible to foretell the exact nature of these changes, based on currently available technology certain broad outlines and trends are identifiable. They provide a strong general indication of future developments.

There seems to be little doubt, for instance, that information, knowledge and education enterprises will employ most U.S. workers during the remainder of this century. As of 1981, more than half the U.S. work force was employed in these fields, and most forecasts call for a figure of about 66 percent by the turn of the century. Thus, by the year 2000 approximately two out of every three workers will be engaged in some activity dealing with knowledge and information.

Both a major cause and effect of this employment shift is the fact that greater numbers of people will require education for longer periods of time. As new technology demands new competencies, more people require education to meet those demands, creating more pressures for still more educational technology which, in turn, creates demands for still newer skills. Thus, the cycle continues. We have already seen the beginnings of this spiral in such areas as the burgeoning demand for computer specialists and secretaries trained to use electronic office equipment. As a result, the private sector of the U.S. economy already spends as much or more than the public sector on education.

There is little doubt that this trend will continue and that it will be accompanied by a rapid rise in home study as increasing numbers of people search for professional and personal fulfillment. In the home,

personal, often individualized, study will both grow out of and depend upon an array of increasingly sophisticated equipment, much of which is already available. Before examining the implications of these social and educational changes on school homework policies, it might be well to discuss briefly some of the equipment currently available, together with its instructional potential.

Cable Television

In recent years the availability of cable television has increased substantially, and all indications are that this trend will continue to accelerate. With direct satellite broadcasting to rural areas, reception of 50 or more TV channels will soon become possible everywhere in the United States. Many of these new channels will be educational in nature. Some may be linked via central computer to provide interactive capability, that is, they will enable the viewer to respond as well as to watch. Such systems are currently being field-tested in both the United States and Japan. The educational implications of such systems, capable of monitoring individual progress, storing individualized programs, pacing material according to user ability far exceed those of any form of educational home instruction available in the past (apart from tutoring).

Home Computers

As these devices become widespread, a trend that is almost certain, they promise to provide an enormous range of educational possibilities. Capable of a wide variety of functions on their own, they may also be linked with cable television and, via telephone lines, with other computers. The result will be an almost limitless access to information in the home, as well as the ability to program the information according to the user's desires.

Videotape and Videodiscs

If cable TV can be likened to the magazine of the future, videotapes and videodiscs may be our new books. This is not to suggest that these

devices will replace the printed word. The analogy refers to the way in which these devices store and display information. The viewer can recall and replay individualized sections quickly, and "open up" the tape or disc to any "page" and "reread" it as often as desired. This is a marked departure from previous educational films and television. In fact, one disc system currently being marketed contains 54,000 frames, each capable of displaying a page of print, on a single disc about the size of a long-playing record. This system can show a video segment followed by print - for example, an instructional film followed by a test. Depending on the user's test results, different video segments follow. Paired with a home computer, the possibilities are virtually limitless.

Information Utilities

These are private companies which will make available to owners of home computers for a subscription fee data bases or data banks. For the cost of the subscription fee, the user can currently obtain information ranging from business and financial reports, to discount shopping services and airline schedules, to computerized games. Several educational programs, including foreign languages, mathematics, spelling, and grammar, are also available with more expected to follow soon.

Almost all experts are agreed that these devices (as well as others still under development) taken collectively will produce massive changes in U.S. society. Methods of shopping, working, banking, communicating, and even cooking, will probably be markedly altered in the near future. For teachers in particular these devices portend important changes in both students and in learning patterns. The first phase of these changes will see students as well as adults shifting from television viewing to television using. For some people, used to more than three decades of passive TV viewing, this shift will not come easily; there is in fact considerable debate as to how quickly the shift will come. Once old habits and attitudes are shed and replaced by new ones, however, we can expect to see a rapid acceptance of the household television set as a learning center. And as information and

knowledge become readily available in the home, the role of the school, and particularly of homework and home study, can be expected to change also. As more people begin to take more personal charge of their own education, particularly through home instruction, they will expect homework to fit into their broader educational expectations. Ironically, the television set that is now the "enemy" luring the student from study with entertainment may soon become an educational rival. Obviously, the need for close cooperation between home and school will become increasingly imperative.

Interestingly, this shift is in many ways a reversion to earlier patterns of learning in this country. Until the relatively recent growth of free public education through the secondary level and the resultant large increase in higher education, at-home self-instruction was commonplace. Throughout most of the nineteenth century, family medical books, agricultural pamphlets, and a wide variety of self-study materials were accepted parts of rural U.S. households. In many ways, the changes that lie immediately ahead are a return to these earlier patterns rather than a departure from present practices.

For the teacher interested in the question of homework, the primary significance of these trends lies not in their suggestions for present homework practices but rather in their implications for future practices. As the transition to the Communications Era or Information Society continues, teachers will need an increasing awareness of shifting roles and expectations. They will also need to base their out-of-school assignments on a solid understanding of, and close cooperation with, the home educational environment.

CONCLUSION

Considering the history of home study in U.S. education, the findings of research and experience, and the impending emergence of an information society, a list of basic guidelines and principles can help the classroom teacher arrive at a feasible homework policy.

1. In the early school years traditional homework assignments are not very effective. Therefore use them very sparingly. In the primary grades there is little justification for *any* homework.

2. In the elementary grades devote substantial amounts of time and effort to establishing study habits and learning skills. This work should extend beyond traditional reading-study skills and library research. Insofar as practical, help young students become familiar with more recently developed means of storing and retrieving information—computer terminals, video tapes and discs—not to become accomplished researchers, but rather to feel comfortable with the variety of means at their disposal.

3. At all levels of schooling, allot considerably more time during the school day to independent study and guided research. Wherever possible use study halls and free periods as opportunities for students to pursue individual academic interests and to become proficient at a variety of research techniques.

4. Make a basic aim of all homework learning how to learn, not merely preparation or practice. To this end, be sure that homework assignments—

   a. Stress student initiative and freedom. Allow students to play a primary role in fashioning out-of-class work, giving them considerable latitude in determining how to accomplish the tasks chosen.

   b. Are as individualized as possible. Structure assignments taking into consideration student abilities and interests.

Base even relatively routine assignments on knowledge of student progress and achievement. Individualized assignments calling for individual responses are more likely to be effective than group work.

c. Require imagination and creativity whenever possible. This does not mean that each assignment should call for an artistic response, but it should provide an opportunity for students to use imagination and creativity in identifying and applying research techniques.

5. Be sure that the purpose of out-of-school assignments is clear and important to students. Those who know why they are working and what they are working toward will gain greater benefit from the assignment than those who lack such knowledge. Clearly define in advance all assignments and projects, even those initiated by students.

6. Research and experience indicate that—

   a. Able students are more likely to do routine homework assignments and less likely to profit from them.

   b. Slow students are less likely to do routine homework assignments and more likely to profit from them.

   Therefore, assign projects, independent study, and the like to the more able and accomplish routine preparation and practice in class with slower students.

7. Give recognition to completed homework assignments. This is not to say that grading homework is a desirable practice, but that a student who has spent considerable time completing a task deserves some sort of recognition for having done so.

8. Provide all students, but particularly the more able, with frequent opportunities to engage in long-term projects which they have helped develop.

9. Give careful consideration to demands on a student's time. In the upper grades, especially, make a concerted effort to devel-

op policies and practices that strike a balance between the time demands of the various subjects. A most effective way to accomplish this is through integration of assignments such as a common list of supplementary readings developed by teachers of closely related subjects.

10. Recognize the importance of homework in the home-school relationship and do whatever is possible to keep parents informed of the kinds and amount of home study required. As the school and the home share more of the responsibility for education in the years ahead, cooperation between home and school is even more imperative to develop a sound and sensible educational program for the student.

While these guidelines cannot ensure the success of a home-study program, they will go a long way toward making homework the significant learning experience it can be rather than the mindless drudgery many students perceive it to be.

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ABSTRACT

The purpose of this study was to explore how children use location and distance cues to reproduce movements as compared with adults. Subjects were three groups of children, aged 6, 8, and 10, and one group of adults. A linear slide was used by the blindfolded subjects to indicate one of two experimenter-defined stops. Distance and location were tested on separate days. All subjects reproduced locations more accurately than distances, and adults were more accurate than children. Children seemed to use location information to reproduce movements, even when instructed to use distances. It was unexpected that no strong retention interval effect emerged. Subjects may have been cued inadvertantly to rehearse, resulting in performances that did not deteriorate following a retention interval. (Authors/FG)

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Age Differences in Short Term Memory: Retention of Location and Distance Cues

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Previous studies of age differences in short term memory for movement reproduction have had two major inadequacies. First, investigators have typically examined only the reproduction of locations. They apparently have assumed that children retain movement characteristics in the same manner as adults, who have been found to recall locations more accurately than distances. Second, most of the investigations with children have involved special populations (e.g., MRs, Blind, Autistic), while ignoring the performance of normal children. The purpose of this study was to alleviate these deficiences by investigating the reproduction and retention of distance and location information by normal children as compared with an adult control group.

In previous research, Kelso and his colleagues (1979) investigated reproduction of locations by mildly retarded children with mental ages between 6 and 9 years. They found that these children were more accurate when they had to reproduce a location immediately than when a 15 second retention interval intervened. No differential effect for age was found following either retention interval, suggesting that neither group of children was actively rehearsing.

Kelso and his colleagues (1979) tested their subjects using two movement lengths (short and long). Their children overshot both targets, regardless of age. They overshot the short target by more than the long target, however. Younger children overshot both targets to a greater degree than the older children did. These results differ from the "range effect" (Pepper & Herman, 1970) so typical of adult performances: On short movements, adults consistently overshoot and on long movements, they usually undershoot.

A study by Hermelin and O'Connor (1975) was the only one in which both distance and location cues were investigated systematically in children. They tested blind, autistic, and blindfolded, normal children using vertical movements. They found that the blind and normal children, aged 10-15 years, could reliably and similarly reproduce locations, but not distances. Autistic children had larger errors than either of the other groups, but still reproduced locations more accurately than distances. In addition, errors for longer distances were greater than for farther locations for all children. Blind children undershot more than sighted children as distances increased, however.

To summarize, past investigations of age differences in short term memory for movement reproduction, have dealt primarily with special populations. These studies have examined how blind, autistic or retarded children used locations cues to reproduce simple movements. The purpose of this study was to extend these previous investigations by exploring how normal children use location and distance cues to reproduce movements.

Method

Subjects. Four groups of subjects (15 per group) were tested in this experiment. Children of 6 years ($\bar{X}$=73.6 months, σ=2.9), 8 years ($\bar{X}$=96.6 months, σ=2.6), and 10 years ($\bar{X}$=126.4 months, σ=3.5) and adults ($\bar{X}$=26 years, σ=3.8) participated. Permission was secured for all subjects or their parents prior to their participation. All subjects were volunteers.

Apparatus. A linear slide, similar to those used in other movement positioning studies, was used in this investigation. Subjects' performances could be measured to .1 cm accuracy. During testing, subjects were blindfolded and wore headsets. Low volume white noise, introduced through the headphones, excluded extraneous environmental noise. All directions

to the subjects were given through the earphones.

Procedures. Subjects were naive about the purpose of the study and were told only that it required making and remembering simple horizontal arm movements. Instructions were modified for age, where appropriate. The task required subjects to move a handle horizontally to one of two experimenter-defined stops while remembering either the movement's distance or the endpoint's location. Movements were 15 and 45 cm in length. Subjects tried to repeat the criterion movement from one of four different starting positions. They were tested on distance and locations conditions on separate days. Each session consisted of 32 randomized trials where half of the trials were reproduced immediately; half were reproduced 15 seconds after the criterion presentation. The order of administration of conditions was counterbalanced across subjects.

During the testing period, random praise was given for performance, regardless of the subject's true level of accuracy. No specific knowledge of results was given. All subjects, especially children, were reminded occasionally to concentrate on the task.

Results

For both constant and absolute errors, there were significant main effects for age ($F_{3,56}$=43.12 and 42.80, respectively, $p < .01$), mode (i.e., distance and location) ($F_{1,56}$=8.04 and 455.90, $p < .01$) and movement length (i.e., short or long) ($F_{1,56}$=78.09 and 18.68, $p < .01$). In addition, significant interactions were found between age and mode ($F_{3,56}$=67.65 and 46.29, $p < .01$), mode and movement length ($F_{1,56}$=11.98 and 44.98, $p < .01$), and retention interval and movement length ($F_{1,56}$=40.44 and 24.85, $p < .01$) for both dependent measures. For CE, the age X movement length ($F_{3,56}$= 5.87, $p < .01$) interaction also reached significance.

Post hoc Scheffe tests were performed on comparisons of interest. Figure 1 illustrates one of the interactions (age X mode), for AE. Clearly, all the children had larger errors than the adults for distance reproduction as compared to the location condition. The 6 year olds had larger errors compared to the 8 and 10 year olds for location reproduction. When age and movement length were compared, children had larger errors than adults for both short and long movements (Figure 2). Although all the children overshot short movements similarly, the 6 year olds overshot the long movements by less than the other children. All the children differed from the adults, who demonstrated a typical "range" effect.

One final analysis was suggested from observation of subjects' performances. Despite the care that was taken to make certain that children understood the task when they reproduced distances, they still appeared to be biased to reproduce locations. To test this notion formally, the data from the distance condition were transformed to equivalent location scores. These transformed scores than were compared with actual performances in the location condition. These analyses were non-significant for all the children, demonstrating that they always attempted to reproduce locations (Figure 3).

Discussion

The pattern of age differences found in this study was not as clearcut as might have been anticipated from the results of previous investigations. Although there was an overall significant effect for age, this was obviously attributable to better performances by adults, relative to all the children. Several interactions did help to clarify the occurrence of differences between the children, however. In general, these interactions suggested that the 6 year olds performed differently from the 8 and 10 year olds,

while the 8 and 10 year old children performed similarly. For example, all of the children performed similarly when distances were being reproduced. In contrast, 6 year olds were less accurate than the other children when locations were being reproduced (Figure 1).

While the finding of age differences at locations was anticipated, similar differences were expected for distance reproduction. It was surprising to find that all of the children seemed to use location cues when reproducing all movements. Informal observation had suggested that the 6 year olds (and possibly some 8 year olds) had performed in this manner. It was not anticipated that the 10 year olds would also use only locations, however.

The exact reason for these results was unclear. Care was taken to ensure that subjects understood the distinction between distance and location prior to the initiation of testing. Before testing could begin, subjects had to be judged to have a cognitive understanding of the distance concept. It seemed that the children failed to translate their apparent knowledge of "distances" into use in the actual reproduction of their movements.

The use of two different movement reproduction lengths resulted in additional age differences (Figure 2). Consistent with previous findings by Kelso and his colleagues (1979), the children overshot short movements by more than long movements. Contrary to Kelso's study, our children performed similarly on short movements, while younger children overshot less than older children for long movements. Hermelin and O'Connor (1975) found a similar phenomenon with their blind and autistic children as vertical heights increased. They suggested that blind children may have difficulty in reaching outside their immediate body space. Young children in this study may have demonstrated a similar limitation. Warren (1974) suggested that there are two separate systems for remembering movements: One operating

within the immediate body space, the other for movements outside that immediate sphere. Perhaps developmentally young subjects learn to use the inner space first; accurate movements in the outer sphere may occur later.

An unexpected finding in this investigation was the lack of a strong influence for retention interval. Two previous investigations, involving either adults (Laabs, 1973) or children (Kelso et al, 1979) found significant retention interval effects. In these previous studies, however, the influence was demonstrated by increased variability over the retention interval. Variable errors (VE) were not analyzed in this study (Safrit, Spray, & Diewert, 1980).

Kelso et al (1979) also found a main effect for retention interval in their AE analysis. In this investigation, retention interval just failed to reach significance at the .01 level. Even these results were puzzling, particularly since adults were included in this design.

This unexpected pattern of results may have occurred due to a procedural emphasis. Wickens (1974) and others (e.g., Sroufe, 1971) have suggested that some of the age differences found in studies are attributable to differences in the attentional level of subjects. Young children are not as motivated to stay on task, and subsequently perform more poorly than their older peers and adults. Pilot testing had suggested that younger children would have difficulty remaining on task, particularly over a 15 second retention interval. Therefore, in this study, subjects were occasionally reminded to stay on task. In an effort to account for the relatively higher level of inattention by younger children, they were cued more often than older children and adults.

This effort to keep children on task seemed to have led to an inadvertent result: Rehearsal by the children. Although young children usually do

not spontaneously rehearse, they can be induced to do so on specific tasks (Appel, Cooper, McCarrell, Sims-Knight, Yussen, & Flavell, 1972; Flavell, Beach & Chinsky, 1966). Therefore, by giving these children cues in an attempt to maintain their attention to the task, it is likely that we helped them to rehearse the information. This additional cue may have eliminated the usual increase in errors found for young children who are asked to retain information over a retention interval.

In summary, there were differences and similarities in the results of this investigation compared to previous studies of short term memory for movement reproduction. First, all subjects reproduced locations more accurately than distances and adults were more accurate than children overall. Children apparently always used location information to reproduce movements, even when instructed to use distances. While children overshot both movement lengths, as previous investigations had found, the youngest children overshot short movements less than others. That finding was contrary to the results of at least one other study. Finally, it was surprising that no strong retention interval effect emerged. Subjects may have been cued inadvertently to rehearse, resulting in performances that did not deteriorate (as expected) following a retention interval.

NOTE

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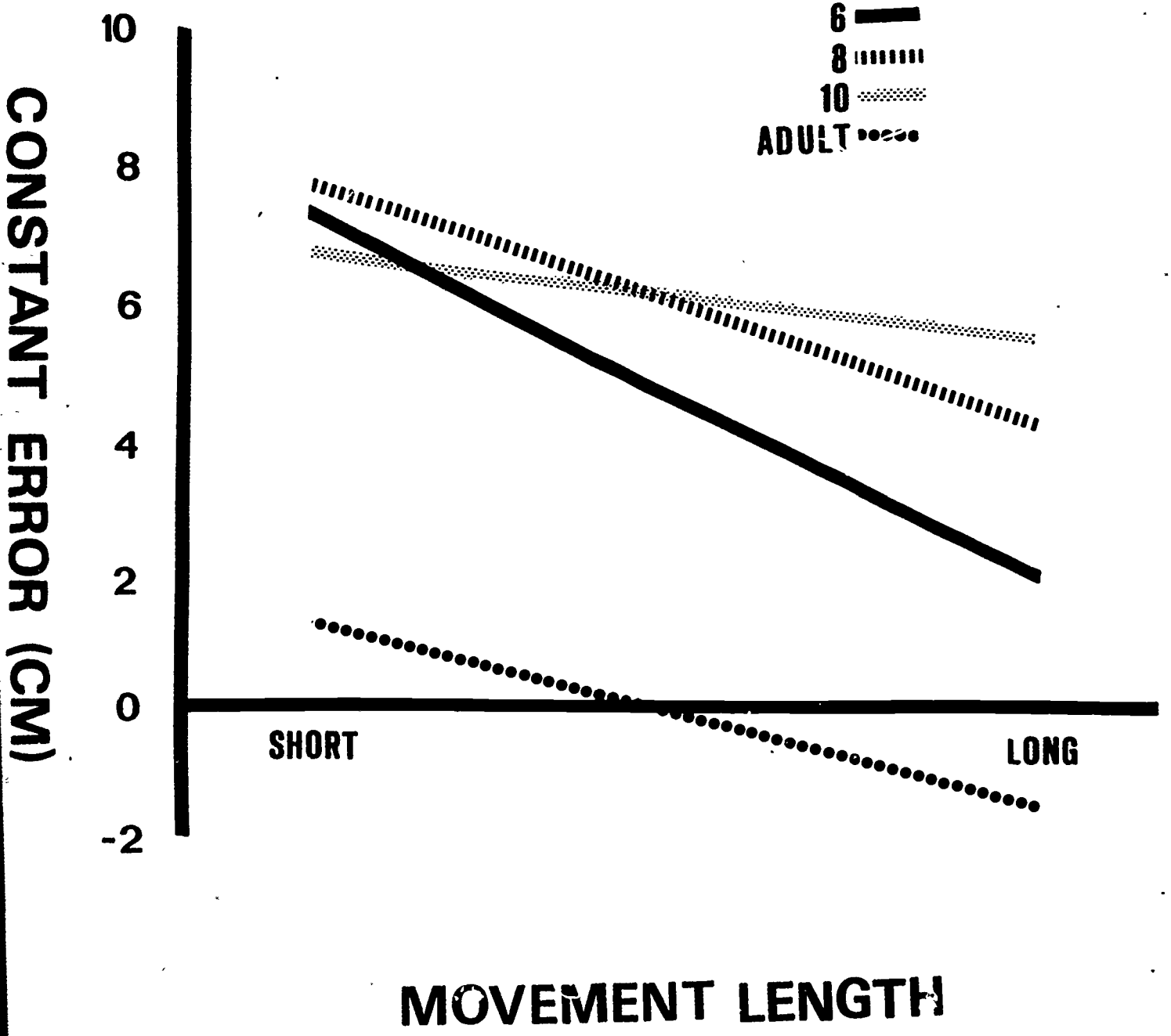
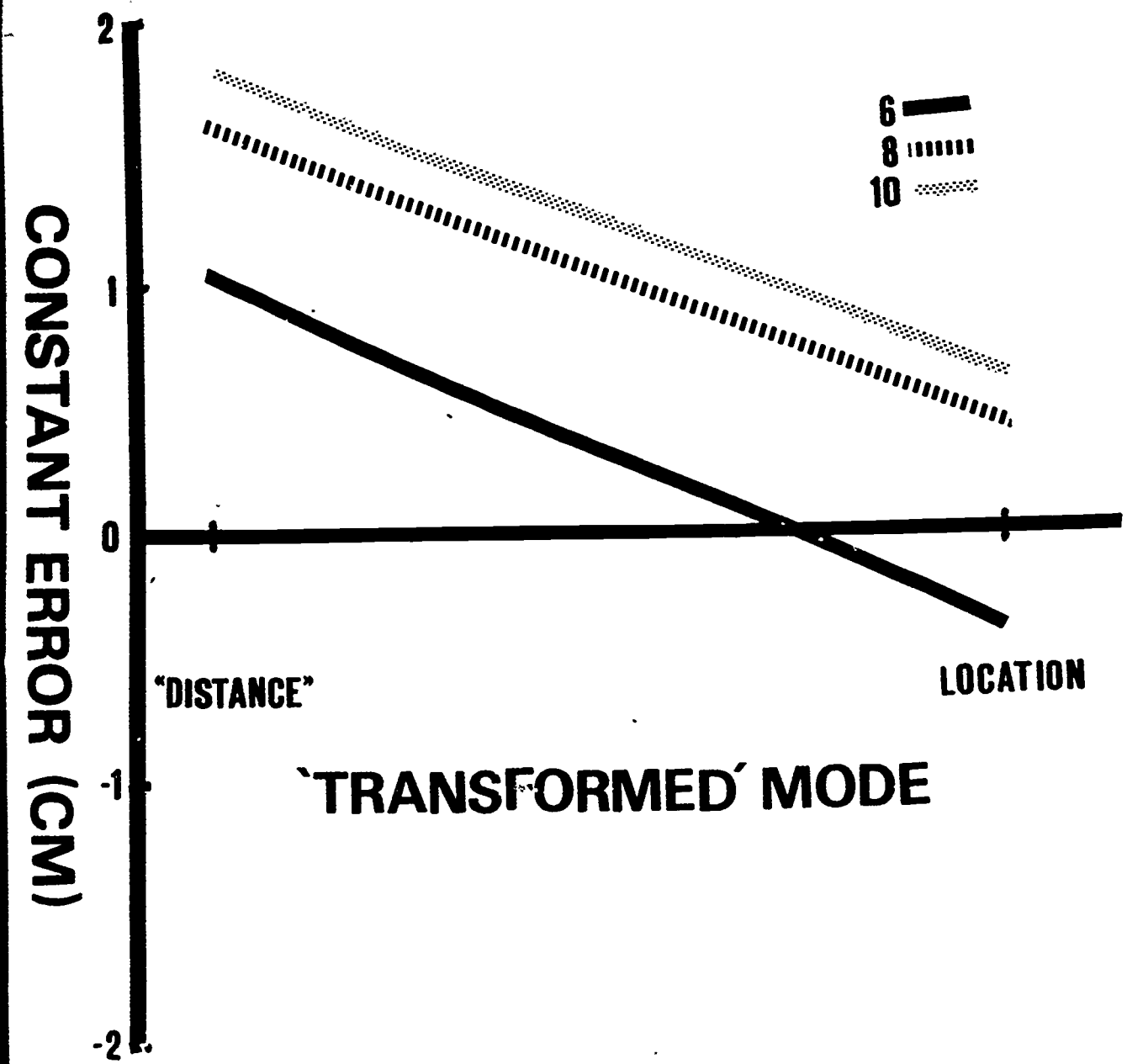
FIGURE CAPTIONS

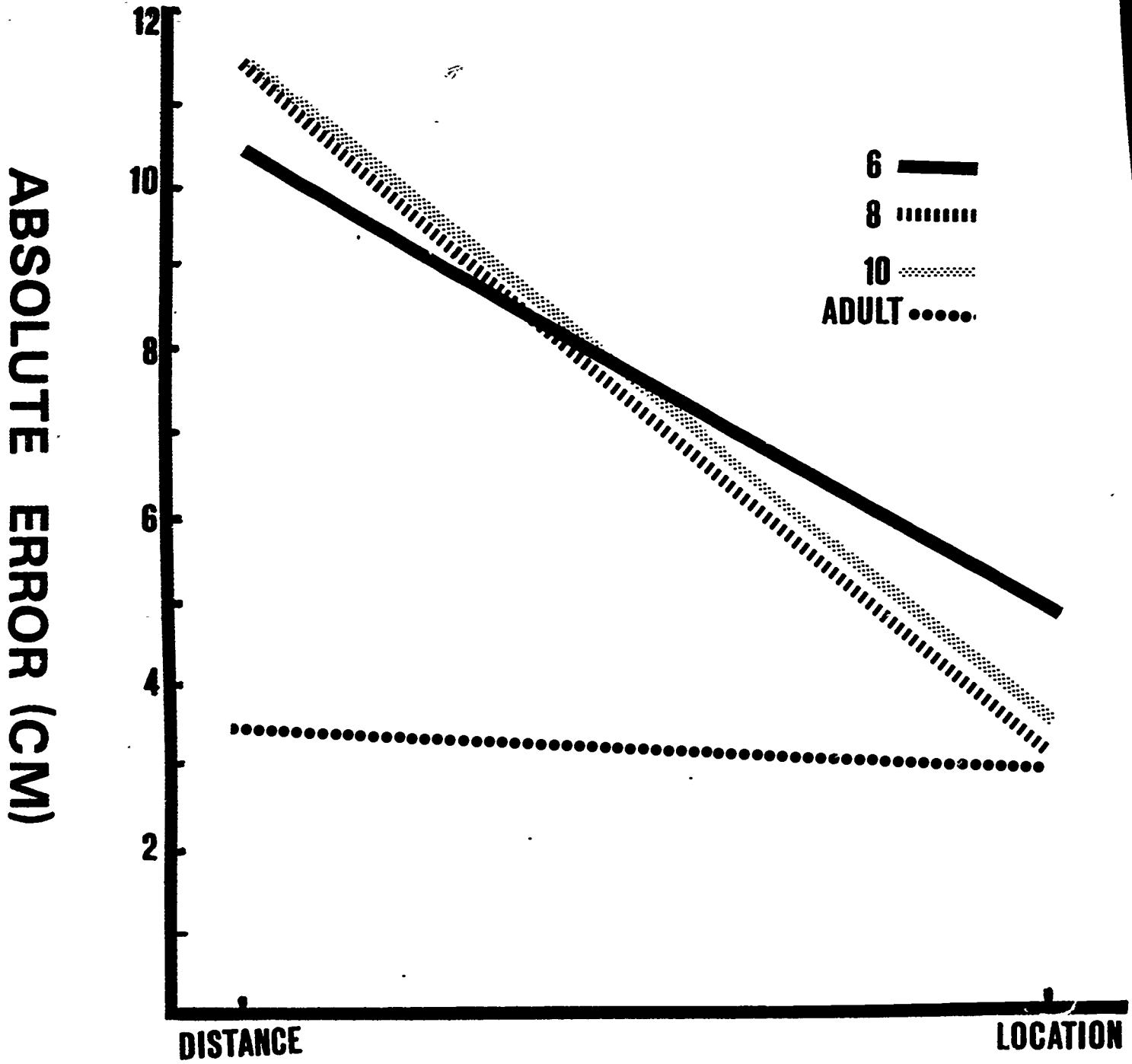
Figure 1. Age differences for children and adults in the magnitude of absolute errors for distance and location conditions.

Figure 2. Age differences in constant errors for short and long movement lengths.

Figure 3. Age differences for children in constant errors for transformed distance and location conditions. Distance condition errors have been transformed to equivalent location error scores.


6
8
10
ADULT
10
8
6
4
2
0
-2
SHORT
LONG
CONSTANT ERROR (CM)
MOVEMENT LENGTH


2
1
0
-1
-2
CONSTANT ERROR (CM)
6
8
10
"DISTANCE"
LOCATION
`TRANSFORMED' MODE


ABSOLUTE ERROR (CM)
12
10
8
6
4
2
6
8
10
ADULT
DISTANCE
LOCATION
MODE